DOCUMENT RESUME

ED 349 940 IR 015 671

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TITLE The Ideology of Computer Literacy in Schools.
PUB DATE 23 Apr 92
NOTE 17p.; Paper presented at the Annual Conference of the American Educational Research Association (San Francisco, CA, April 20-24, 1992).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Adoption (Ideas); Automation; *Computer Literacy; Computer Science Education; Educational Innovation; Educational Policy; *Educational Trends; Foreign Countries; High Schools; Information Technology; Interviews; *Student Attitudes; *Teacher Attitudes
IDENTIFIERS Canada; *Computer Attitudes

ABSTRACT

This research project brings a critical perspective to the examination of computer literacy as an ideological form through a study of the reactions of high school teachers and students. On-site interviews with teachers and students found both acceptance of and resistance to the message of adjustment to an inevitable future of vocational and marketplace automation. It is concluded that, while the trend toward technologizing the schools cannot and should not be halted, teachers themselves should become more critical of the purposes of computerized education and begin to insist on a more serious role in defining and directing the appropriate use of information technology in their classrooms. Possible new directions for educational policy are suggested, including: ameliorating the myth of inevitability of automation; realistically portraying future job markets that will demand a minority of jobs requiring intensive computer knowledge and the bulk of jobs requiring a minimal ability to work with computers as tools; applying a more focused, lower level of computer use instead of a broad-based computer literacy program; ensuring a combination of high-technology learning aids with meaningful human interaction in order to further the development of complete human beings; critically questioning the acceptance of computer literacy; and allowing an equal right to a place in school and society for those students who find they do not get along well with computers. (Contains 20 references.) (ALF)

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THE IDEOLOGY OF COMPUTER LITERACY IN SCHOOLS

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Paper presented at the annual meetings of
The American Educational Research Association
San Francisco, California, April 23, 1992

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Conceptualizing Computer Literacy

One of the most striking trends in Canadian schools, and throughout the industrialized world today, is the rapid introduction of computers into classrooms. Governments are spending billions of taxpayers' dollars on educational computing systems (see Becker, 1990; Pelgrum & Plomp, 1991). Perhaps the most common rationale for this flood of hardware and software is the concept of "computer literacy". When the Minister of Education for the Province of Ontario announced a major government initiative to introduce computers into schools, for instance, she stated that "It is now clear that one of the major goals that education must add to its list of purposes, is computer literacy" (Stephenson, 1981, p. 7).

The concept of computer literacy, however, is poorly defined and delineated. As Ragsdale says:

> Competing definitions have rendered the term 'computer literacy' almost meaningless. Some proponents of computer literacy emphasize the need to provide students with a complete set of computer skills, information on how they are used, and knowledge of their effects. Others urge a less structured approach, allowing students to learn about computers through writing, drawing, or composing music. Finally, an emphasis on computers as communications media leads to the stressing of applications such as electronic mail, computer conferencing, or the ubiquitous 'bulletin boards'.... (Ragsdale, 1988, p. 160).

For most people, I suspect that "computer literacy" means all of these things — a general, diffuse familiarity and comfort with computers. In fact, becoming "comfortable" with computers is frequently seen as being equally, if not more important, than becoming "literate", in the sense of possessing technical fluency. In 1984, the Ontario Deputy Minister of Education stated that "the system of basic education must help develop in the general population some degree of psychological 'comfort' with and acceptance of the new technology and the need to apply it" (Penny, 1984). In the same speech, he used terms like "attitudinal conditioning" in describing the purposes of computers in schools. Statements such as these indicate the importance attached to the symbolic functions of computer literacy by the bureaucrats who have developed and supported the concept.

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If there is confusion about the meaning of computer literacy for schools, however, there is also a lack of clarity about its goals. There are a number of different historical "visions" or "traditions" about the basic purposes of schooling, but two of the most important have been the *developmental* and the *vocational*. The *developmental* tradition selects forms of knowledge for their importance to the learner's ongoing cognitive and affective development. The primary criteria are the needs and interests of the learner. The *vocational* tradition, by constrast, stresses the occupational destinations and needs of the learner. In this tradition, knowledge is chosen for its value in the preparation of a skilled workforce, and in aiding learners to develop the knowledge and skills which will maximize their potential in future work (see Goodson & Mangan, 1992).

Although computer-literacy justifications have regularly appealed to both of these traditions, in their most common form they are essentially *vocational* arguments. They assert that computers will be very much in evidence in the workplace of the future. Therefore students must have some knowledge of how computers function, in order to be comfortable and competent in such a workplace. A related form of the computer-literacy argument does not rely entirely on the concept of vocational training, however. It rests more on a kind of technological fatalism, which suggests that computers are going to be "everywhere" in the future — from banks to grocery stores to TV sets to cars — and that, whether students will need computer skills in their work or not, they need to have some general idea of how to operate a computer console just to deal with these exigencies of daily life. If computers will be everywhere, then why not in the schools?

Of course, there are some more purely academic and/or pedagogical arguments: that learning about computers is a worthwhile experience in and of itself; that it encourages the learning of formal logic and mathematics (on which all computer functioning is based); and that computers can be useful productivity tools for other academic work. Although such arguments as these are beginning to appear more frequently, the vocational emphasis is still the most predominant.

Taken together with the emphasis on "improving attitudes" which is often a part of the idea, these arguments constitute what can be termed "the ideology of computer literacy". "Ideology" may at first seem to be too strong a term, suggesting as it does that the concept of computer literacy constitutes a belief system which grounds a range of social and political actions, and which works to the advantage of certain social groups while disadvantaging others. If we look closely at the avowed purposes of computer literacy, however, and at who stands to benefit from its acceptance as an educational objective, we can begin to recognize its ideological aspects.

The need for computer literacy has become widely accepted as a kind of value-neutral, technological necessity of modern life. Since 1980, despite a succession of Governments representing all three major political parties in Ontario, it has remained an important priority of

the educational system. Computer literacy may not be as neutral as some of its proponents assert, however. In fact, some critics have attacked the claim of value neutrality as itself ideological. Bowers (1990) has maintained that the concept of computer-mediated language as a neutral conduit of meaning is deceptive, and ignores the importance of discursive context to for all human interaction. Roszak (1986) has pointed to some of the potentially dangerous political consequences of "the cult of information." Noble (1984) has been unstinting in his criticism:

> When one considers how education for computer literacy enfeebles in the name of empowerment, mystifies in the name of demythology, and disenfranchises in the name of participation, the question must be asked: Is it even possible in the current ideological climate to provide a potent pedagogy about computers? (p. 613).

Noble offers powerful arguments that the introduction of computer literacy as an agenda for our schools is motivated more by the needs of business and the military than by its inherent educational worth. He is not alone in his suspicions. Prominent Canadians such as Stephen Lewis, the former Ambassador to the United Nations, have expressed fears that a preoccupation with computers is forcing more traditional, and more enriching, forms of literacy off the agenda of the public schools (Lewis, 1990). David Suzuki has said that the "cry for computer literacy has been, in my view, one of the biggest cons ever foisted on the school system" (Suzuki, 1989, p. 195).

In spite of these criticisms and cautions, however, the ideology of computer literacy as an educational necessity persists, and is constantly reinforced by educational bureaucrats and specialist teachers. The purpose of this paper is to examine how a critical treatment of computer literacy as an ideology may illuminate this pervasive trend, and to offer some empirical evidence from a recent Canadian study as to how that ideology is encountered and embodied in the practices and beliefs of students and teachers. I will suggest that educators interested in the developmental aspects of schooling need to take a closer look at the potential costs, both monetary and human, of a passive acceptance of the ideology of computer literacy.

Re-examining the Reasons for Educational Computing

Perhaps the most basic justification for advocating a computer-literacy curriculum is the widely-accepted myth of the "coming Information Age", and its impact on future job markets. As several critics have pointed out, the concept that the majority of future jobs will require computer skills rests upon a superficial analysis of vocational trends (see, for instance, Apple, 1986, 1987; Menzies, 1989; Dublin, 1991). In fact, the number of future jobs which will actually require the ability to either program a computer, or deal with sophisticated software in some creative way, will be a distinct minority of the positions created by the Information Age. Rather, the biggest growth areas will be in service and clerical jobs, precisely because traditional

semi-skilled jobs are being displaced by automation. Professional-level information management jobs will increase, but not as fast as these more mundane occupations.

In a similar way, the fact that computers are everywhere, from grocery store check-outs to fitness parlours, hardly implies a requirement for computer skills. Many of these systems have been designed to be "user-friendly," but that very "friendliness" is based on making the operation of the machines as simplistic as possible, usually requiring only a minimum of reading abilities and motor skills. Understanding the principles of operation behind such machines is neither required, nor particularly beneficial. In fact, troubleshooting these machines, which used to be a part of the operator's job, is now no longer possible for any but the most highly-trained and well-equipped technicians. General computer skills will not, for instance, make modern automotive engine-management systems understandable to the average motorist. Many components are, in fact, sealed to prevent tampering by amateurs. Thus, the vocational justification and the ubiquity argument can be questioned. As Aronowitz and Giroux (1985) have said, "rapidly changing technologies will require less, not more, training for the majority.... specialized vocational training has less applicability to the work world than ever before." (p. 189).

It may, however, still be the case that computer use encourages the development of general organizational and problem-solving skills. This is a frequently-made claim, although the empirical evidence for it is sketchy (see Beynon, 1991). Even on purely pedagogical grounds, there is room to question some of the elements of the ideology of computer literacy. All of the arguments cited rest on some further assumptions: that all computers share some common elements of operation, that learning about one computer will help a student learn about others, and that computerized learning is cumulative. Experience with one kind of computing is assumed to contribute to the development of attitudes and skills which will facilitate further computer literacy. Can these assumptions always be taken for granted?

It is at this point that many analyses of the social effects of ideologies falter, by remaining unconnected to any empirical evidence. They frequently tend to deal solely in theoretical relationships regarding "popular beliefs" versus "minority interests." I would like to counter this trend by presenting excerpts from the qualitative data gathered during a major three-year research project in which I took part.[1] By reviewing some of the evidence accumulated in high school classrooms by our research project, we can begin see what the state of computer literacy as an educational enterprise is at present in these schools.

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[1] "Curriculum and Context in the Use of Computers for Classroom Learning" was a three-year study, carried out by the Faculty of Education, University of Western Ontario, in co-operation with the Board of Education for the City of London, Ontario, and funded by the Ontario Ministry of Education. Its co-ordinator was Ivor F. Goodson. Parts of this paper are derived from the summative report of that project (see Goodson, Mangan, and Rhea, 1991).

The Ideology Embodied: Reactions from Teachers and Students

The notion of the inevitable ubiquity of computers was certainly well-established in the high schools we studied, among both teachers and students. In talking with them about their notions of computer literacy, however, we discovered quite a range of reactions to this concept. Although the majority of interviewees believed that computers were the "wave of the future", and that they needed to ride that wave to insure their own success, not everyone was enthusiastic about the prospect. These interviews also indicated that the assumptions about the cumulative nature of computer knowledge, and its transferability both to other computers and other logical tasks, were by no means irrefutably established. Enthusiasm for classroom computing is in evidence in these remarks by Elliot Nance[2], a history teacher:

> I think they're important in the classroom, I think they're going to be important in society, if they're not already. I'd like my own kids to be much more comfortable with computers, just as a way of being able to cope if they have to. So I think by the same token I'd like my students to be comfortable, to recognize that the computer's a pretty powerful machine, can do them a lot of good, especially if they have more mastery or control over it. Now they may already be at that point. In a lot of cases, they're ahead of me, I think. So I still think there's some value in working at implementing computers fully into the system. I guess if I didn't I would've backed out of the project by this point. ... We'll probably have to have a mandatory course in computer literacy that every student will take, and maybe, if necessary, over two years.

Clearly, this teacher accepts the scenario of a future world permeated by computers. His reaction is motivated by a genuine concern for the welfare of his students. What he wants for them is what he wants for his own children: an increase in their competence and power in dealing with the world of information processing. In his opinion, this is important enough that it warrants forcing computer literacy upon students if necessary, through mandatory courses of up to two years' duration. Most other teachers share this commitment. Carl Higgins, a drafting teacher, says:

> I was a bit dubious about the use of computers ... that is becoming less and less. ... I am convinced that it is the way of the future. You can do things that not only look good, but are much faster and much more accurate. ... In the future a person can do it so much quicker ... it will lead to much more productivity and those people without those skills will not have the ability to use computers and computer information ... they will not be redundant, but not able to compete.

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[2] All teachers are identified by pseudonyms assigned to protect their confidentiality. All quotes have been cleared by them for publication. When students are quoted, they will simply be identified as "Student #n".

Carl sees computers as productivity tools, tools with such power that those lacking the skills to use them will be left behind. Our observations of his classroom indicated that persistent hardware and software problems hampered his ability to use the computer system in his classroom, but this has not shaken his faith in the ideology of computer literacy. Harry Thorne, a geography teacher, echoes this faith:

> I mean pretty near any type of occupation that you're gonna get into, having some knowledge on them and seeing how they can be used — not only just in computer studies or other courses that predominantly use them — I think the constant exposure to them, I think it's gonna be very beneficial to the students in becoming familiar with them, and learning how they can use them in a number of different situations.

Here we see the more general form of the ideology of computer literacy, in which computers are viewed as a kind of enrichment resource, without always being tied to either technical or vocational education. Although certainly aware of the vocational arguments, the teachers quoted above also remain oriented to other academic and pedagogical traditions of public education.

As the following classroom observation records show, however, the vocational message is being delivered clearly to students:

From a Sociology class:

> Discussion topic: labour market trends of the future. Based on *Globe* article. Trends: more white-collar, less blue-collar jobs ... big problem of the future is "lack of skilled employees."

From a Commercial Art class:

> Guest lecturer introduces video by saying that computers are the wave of the future in commercial art; students will need to know software to work in the shops of tomorrow (or today). Employers don't want to invest time and money into training; employees who already know the software are in demand.

The latter note comes from observation of a course with a clearly-defined vocational purpose. The argument presented has a double-edged quality: it urges students to acquire specific computer skills in school, because they cannot expect employers to provide it; at the same time, it implies that employers expect the school system to save them money by undertaking the specific types of training that they require for their businesses. This exchange with Ken Morton, an electronics teacher, makes the vocational-push argument even more explicit:

Interviewer: To what extent do you think the kids in your class will be using these things when they leave school, say work-wise?

Ken: As I go around to industry, especially the two areas I get directly involved with ... I find that in all of these areas more and more are getting involved with an *AutoCAD* type of program. So that's one of the things they do. ... Yeah, there's definitely a relation to what they're getting here and what they're going to get in the workplace.
Interviewer: And those are kids who were selected into this class?
Ken: Well, these are computer technology classes....

This quote is from the teacher most directly connected to computer-related vocational training. He is teaching a computer technology class, aimed at developing skills for a defined marketplace. For such a class, it is not surprising that this teacher conducts his own surveys of local industry, and gears his classes to teach precisely the kinds of fluencies required by that industry. The only question to be asked is: to what degree has this model of secondary education permeated other, traditionally more independent, disciplines? Do all teachers presume that industry should define the curriculum, and that the function of the school is to respond to that definition? This is precisely the kind of ideological atmosphere referred to by the crticis cited above.

Not everyone has fallen under the sway of this ideology yet, however. Alone among the teachers participating in our study, Walter Harvey, a fifty-year-old geography teacher, had reservations:

> I don't care about this age of computers and everything else, I — excuse me for being old-fashioned — but a student should be able to sit down and write, maybe not legibly, because I don't, but they should write correctly. They should be able to communicate.

This teacher fears the loss of traditional literacy, the ability to read, write and "communicate" effectively, which may result from an over-reliance on computers. He fears damage to the traditions of his subject and the developmental tradtion with which he identifies. Walter's resistance, however, frequently took contradictory forms. Its most potent expression was the simple fact that he stubbornly delayed the introduction of computers into his classrooms, despite a good deal of pressure from various sources. Yet his resistance never took the form of outright defiance, and the verbal expression of reluctance quoted above was actually an anomaly. It was much more typical for him to attribute his lack of computer use to poor organization and a lack of time. In the same interview cited above, for instance, he said:

> I'm really interested in working with the OAC's [advanced gr. 12 students] on spreadsheets. That sort of grabbed me, and I'm really weak on that. It took me — when I was practising — a long, long time, but I just haven't worked at it, and I've just gotta, next Fall, buckle down and start — start doing it. For contrast. So I see a lot of super potential.

Walter Harvey blames himself for not implementing computers in his classes, and significantly, he refers to the enrichment of his students' learning experiences, rather than market forces, when he expresses enthusiasm for their "potential". His other actions, and comments like that quoted earlier, however, lead us to believe that Walter actually felt that computers were *not* appropriate to his style of teaching and his educational concerns (see Paris, 1991, for similar examples). If this is true, what is significant is that he does not feel it is legitimate to openly express his opposition to classroom computing. The ideology of computer literacy is so strong that he either feels compelled to accept it, despite his own reservations, or feels he cannot legitimately speak out against it.

Not surprisingly, the attitudes of teachers are frequently reflected in the attitudes of their students. Whether this is the result of the transmission of these attitudes in class, or whether both teachers and students are receiving messages from the mass media and other sources, is rather a moot point. What is surprising is that, among the large group of students who accept the ideology of computer literacy, there are pockets of students whose own experiences have led them to question whether they will accept computers as an integral part of their own lives. This questioning can be seen to throw doubt on the assumptions that early exposure to computers is always a good thing, and that computer skills are built up progressively and cumulatively. For most students, however, the conventional wisdom regarding the future of computing is firmly in place. These quotations, each from a different student interview, offer a clear indication of its acceptance:

Student #1 (an adult learner):

> I just think they're a fact of life. I don't see them — I think they're gonna be just as common as televisions or whatever down the way ... . my husband and I have a business, so the necessity is coming ... . I have no choice, I have to learn how to use them.

Student #2:

> In tech areas, I find that you have to have a computer knowledge. 'Cause everything is going more computerized by the minute ... understanding about when you get out into the work force, you — somewhere along the line you are going to have to deal with a computer ... even a car has a computer somewhere in it ...

Student #3:

> I'm going to take a computer course, because — they're like, actually they're probably gonna be the thing of the future. The only thing that's gonna be useful.

Student #4: I figure by the time I get into the work force, I'll need the computer knowledge, at least to an extent.

Interviewer: And what do you plan on doing when you get to the work force?
Student #4: I want to be, um, a teacher.

Student #5:

I just think they're useful, because they are going to become the future. Probably no matter what you do, computers will be needed.

Student #6:

They're coming in, computers are in everywhere now so, I mean, people accept them as just another part of things, so why shouldn't they be part of your school too?

Interviewer: I notice you're signed up to take a computer course next term.
Student #7: I took it because we're going to need it in the future. 'Cause computers are going to be everywhere you go.
Interviewer: Do you have some idea what kind of work you might like to go into?
Student #7: Not really.
Interviewer: But you're pretty sure it's going to involve computers whatever it is.
Student #7: Well, yeah.

In these quotations, we see the full range of the computer inevitability thesis, and its expression in pedagogical as well as vocational terms. "No matter what you do, computers will be needed"; "everybody should become familiar with them"; in fact, they're "the only thing that's gonna be useful." Significantly, one student who plans on teaching as a career views computer literacy as essential. Even those with no specific careers in view "know" one thing, however: "computers are going to be everywhere you go." This fact is so taken-for-granted that in the last quote, the interviewer's challenge of it seems to be considered a stupid question.

One thing is clear: both teachers and students are making important educational decisions on the basis of their understanding of the futurology of computing. Max Dublin (1991) has recently decried this ideology as "Futurehype" — the presentation of one interest group's vision of the future as inevitable. Of course, when a great many people act upon that "hype", it stands a fair chance of becoming a self-fulfilling prophecy.

To say this is not to deny that the use of computers is on the increase, nor even that they serve some very useful purposes. In many ways, the teachers and students quoted above are correct in their perceptions. We cannot ignore the ever-increasing presence of computers in society. The question for educators, however, should be: what precisely are the implications for our image of an appropriate education, and for the present efforts to restructure schools? Does the pervasion of the marketplace by microchips *necessarily* imply that they should also pervade classrooms? Or are the purposes of education sufficiently distinct that we should attend to other

priorities? Does computer use in classrooms really represent the most effective use of our public's dollars, to serve *all* of the purposes of education? Or is the ideology of computing overwhelming other considerations? Finally, what are the implications of this ideology for the actual life of schools? Will computer use be forced upon students, as it is upon workers, or will other options be left open?

Challenges to the Ideology

In the face of the overwhelming conventional wisdom regarding the coming computer age, students who challenge the inevitability thesis are rare. Those who do so are likely to express themselves in confused, contradictory ways. Without a counter-ideology to support them, they find their personal reactions to computing in conflict with both the social trends going on around them, and the accepted notions of what a smart person should be doing to prepare for the future.

Student #8:

> Technology's fine and dandy with me, but I don't know, I guess some people are made for computers and some aren't. But, you know, like, I'm not — I'm not a person that's gonna say, "Well, you know, computers have, you know, there's no use for 'em", because I know, like, where I work, my boss, he does, you know, the files ... they just press a couple of buttons and you know, there you go ... . I see that and that's great, like you know, if that's gonna help me when I'm — whatever job I go into, you know, that's great, but uh, I don't know, maybe just now, I'm young, and I'm naive, but I don't know ... .

Student #9:

> I like them, but I don't think people should get carried away with them. Because some of them think that computers are gonna take over everything. Well, they may, but don't get so adapted to them that you don't even want to go and get anything, you don't want to do anything on your own, you just — you want the computer to do it, you know ... . Don't get carried away with them.

Student #10:

> I think people should have a choice if they want to use them or not, like, if somebody stuck me on a computer, you know, I wouldn't want to do it ... . I just don't have the, you know, desire to, and if there's other people like me, I think that everybody should have a choice. I think it's great if they have computers in the school, 'cause I know there's a lot of people that love them, but ... I don't think they should be allowed in Art at all ... Like, art is something, it's a feeling, and you can't type in a feeling on a computer. So, I don't think they should be in the art room, but that, again, is my — my choice, right, so...

The first of these three quotes expresses a simple and poignant confusion, the voice of someone who is just not sure where he will fit in. The others express a sort of general reservation, a sense that things are going too far, too fast, that there may be certain areas in which computers are not a good thing. They call for moderation, and the preservation of individual choice. They do not constitute a counter-ideology, but the fact that the speakers feel compelled to raise cautionary notes indicates that they feel a certain threat is being posed by the rush to computerization.

Students' attitudes take on other contradictory forms as well, as illustrated by this passage:

Student #11:

> I think it would be really neat if the whole school was done with computers ... I think they're worthwhile. I think they should be brought into the younger grades. ... I mean this is the computer age. Like my dad, he's been having a lot of problems at work lately, because they're trying to switch over to computers ... the guy comes home with the worst headaches, because he's worried about his job because he just can't understand them. And people aren't teaching him because they think he can't handle it. So, if you introduce them in younger grades ... People are just going to be — like second nature, it'll be just like writing or reading. ... I know my dad — my dad would like to get to learn — it's just, he's at work and it's hard for him. Because he's so stressed out, he just wants to learn it so bad, he's having the hardest time, you know ... .

Despite her father's obvious distress as he faces the effects of the computer revolution, this young woman feels that the solution to the problem is further education, both for him and for future generations. Clearly absent is any notion that her father, who works for a railroad, might have a legitimate right to resist the automation of his job. He, like everyone else, must develop a "second nature" — the ability to cope with computers.

There are a rare few who resist even this notion, however:

Student #12:

> Come the 20th Century [sic], I guess, every machine's gonna be pretty well run by computer. But somebody's gonna have to rebuild the machine itself that the computer's gonna be running. So therefore you have to know how to shut the computer down, or to use the computer to move parts out of your way ... I'm a grease monkey.

This young man comes closest to expressing something which might be called traditional working-class pride. He uses terms like "grease monkey" in a defiant way, expressing a certain knowledge that, even if traditional machinists' skills are less in demand in the computer age, the

society cannot run on information alone. Even so, he envisions a need for just enough knowledge of computers to be able to shut them down and get them out of his way. He does not resist the ideology of inevitability, but has developed his own coping strategy, which he feels will allow him to survive on more traditional forms of industrial-era expertise.

The quotes presented above show that students' resistance to the notion of a computerized future is often confused and contradictory, and their reactions to their own experiences with school computing are often similar. In some cases, however, it has crystallized into a firm anti-computing position. The first type of response is illustrated by this exchange:

Interviewer: You say you are going to go into a business career. Do you expect to use computers in the future?
Student #13: No, I didn't like my computer course.
Interviewer: No?
Student #13: No, especially the first time. I had a lot of trouble in the first half.
Interviewer: So you are not that keen, then really, on using them in the future?
Student #13: Well, depends on what it is for. If it's, like for work, no. This is fun. I don't mind typing in stuff and stuff like that but when it comes to learning about the computer I don't really ...
Interviewer: So you don't really care how it works or whatever.
Student #13: No.
Interviewer: You just want it to be easy to use.
Student #13: Yeah.
Interviewer: Do you think you will take any more computer courses or..?
Student #13: Probably. I'll probably have to. I'm working towards a business certificate, so, I think I gotta have a Grade 11 Computer course. Whether I want to or not.
Interviewer: I see. so you think it's pretty well a requirement of the ...
Student #13: Yeah.
Interviewer: Yeah, okay. Well, aside from taking actual computer courses, would you like to use them, sort of like you did here in this class? As just, sort of, one feature of the course?
Student #13: Yeah. That would be cool.

Here we encounter a young woman in a virtual maelstrom of conflicting experience and emotions. Her introductory computer-studies course failed to indoctrinate her, and in fact had the opposite effect of putting her off computer use. By contrast, the more "casual" use of computers in her Family Studies course was viewed as fun. And, despite her avowed distaste for serious computer use, she feels trapped by her desire for a business career: "I gotta have a Grade 11 computer course. Whether I want to or not." She may be correct. She may have no right to aspire to a business career without developing computer expertise. What other aspects of her education are being sacrificed to this necessity, however?

In contrast to the quotes above, not all student resistance is ambiguous. A few students have very strong feelings, both about computer use in society and in school:

Student #14: I don't like to use the computers. It's — well, what you can see, what's being done in society with computers I don't believe in at all, with the big rush for technology, capitalism, it's just all interrelated and I hate it ... like, manual techniques are a lot better than punching in at the front of a computer....

Interviewer: Okay, so you would prefer this course if it never included computers, or do you think it added anything at all?

Student #14: I didn't think it was really beneficial because most of the things we did were things we could talk about.

The last comment by this student raises an important issue for educators: the potential replacement of classroom dialogue by computer interaction. There is much research, including some of our own (see Goodson, Mangan, and Rhea, 1991), which indicates that computer use results in more individualized forms of learning. This may be a good thing, but if it results in isolating students from dialogue with each other and with their teachers, it may at best be a mixed blessing.

Student reactions to the concept of enrichment, or to the gradual accumulation of computer skills, display a similar range of responses, as illustrated by this dialogue:

Interviewer: How about other uses in school...Have you ever had cause to use other computers in school?

Student #15: Yeah, I took, in Grade 11 I took a Computer Science Course ... and so we did a lot of programming in that course.... So that was a quite difficult course actually, here anyways. Because one of the teachers is — he makes it difficult, I found. And I had a Computer, the very beginning Computer course in Grade 10. I can't remember what it was. ... and Computer Science, people won't take, cause, you know, people in school say,"Oh that Computer Science course is so hard." You know, that kind of thing.

What seems to be indicated by this interview, and by several similar ones which have reported negative reactions to computer studies courses, is that the assumption that there is a continuum of computer knowledge which is transferrable from one arena of learning to another may be false. Encouraging students to take computer science or even keyboarding courses in the early years may, for some, actually be counter-productive to the development of attitudes and skills which will be useful in non-technical careers.

Conclusions

In this paper, I have tried to bring a critical perspective to the examination of "computer literacy" as an ideological form. I have tried to show that, despite its vagueness, and its attempt to appeal simultaneously to the various traditions and goals of education, its message is primarily one of adjustment to an inevitable future of vocational and marketplace automation.

By talking directly to students and teachers in schools, our research project found expressions of both acceptance and resistance to this message. Resistance was often expressed in contradictory ways, but nevertheless raised important issues for consideration by educators: Is the ideology of computer literacy being imposed on schools unnecessarily? Is it, as it claims, serving a broad range of genuinely educational purposes? Or are the real purposes of classroom computer use perhaps even *primarily* ideological? Are computers being introduced to schools for the main purpose of conditioning students to accepts them as part of their everyday lives, whether they find them beneficial or not? Is it possible that their chief purpose is to promote acquiescence, to encourage acceptance of forms of technology and automation which benefit employers, at the expense of employees?

I will not pretend that the trend toward technologizing the schools can be halted; I am not even sure that it should be. What I am suggesting is that teachers themselves should become more critical of the purposes of computerized education, and begin to insist on a more serious role in defining and directing the appropriate use of information technology in their classrooms. Though admittedly scanty, the evidence presented here points toward a number of possible new directions for educational policy. First of all, an effort could be made to ameliorate the myth of inevitability. Even *within* the vocational tradition, we need realistic portrayals of future job markets which would recognize that the number of high-tech jobs which will actually demand intensive computer knowledge will be a small minority of those available. Instead, a certain minimal ability to work with computers as tools will characterize the bulk of jobs that use computers at all. The implication of this recognition is that instead of the broad-based computer literacy programmes being advocated, a more focused — and for most students, a generally much lower — level of computer use in classrooms may be appropriate.

There may also be an acceptable role for computers within the developmental and pedagogic traditions. Several exciting experiments with networked learning are currently under way (see, for instance, Teles and Duxbury, 1991) — experiments which concentrate on using computers as tools for the furtherance of exploration and dialogue, not for isolated exercises, or purposes of "attitudinal conditioning". We must be cautious, however, that the ideology of computing does not blind us to the costs, the difficulties, and the trade-offs involved in these experiments. Whatever the strengths of high-technology learning aids, they must be combined with meaningful human interaction in order to further the development of complete human beings.

Most importantly, educators need to question whether in fact they themselves have accepted the ideology of computer literacy uncritically. The pressure comes from many sides: from industry representatives anxious to sell computing hardware; from parents who think their children need to be equipped with computer skills in order to compete, both in school and at work; and from other teachers and administrators who want to feel that they are modern and up-to-date (or who are carving themselves a profitable career niche as a "specialist"). All of these forces may conspire to push computerized learning into places where it does not contribute to the larger goals of the school. Teachers and administrators need to ask themselves whether the vocational argument need apply to all subject areas, including art, geography, and English. They need to question the assumption that all computer training results in a smooth ascent up an imaginary ladder of skills. And they need to question whether students who find, for whatever reasons, that they do not get along well with computers, must be penalized for that distaste, or whether they have an equal right to a place in school and in society.

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